TUFF WAFER EXPERIMENTS

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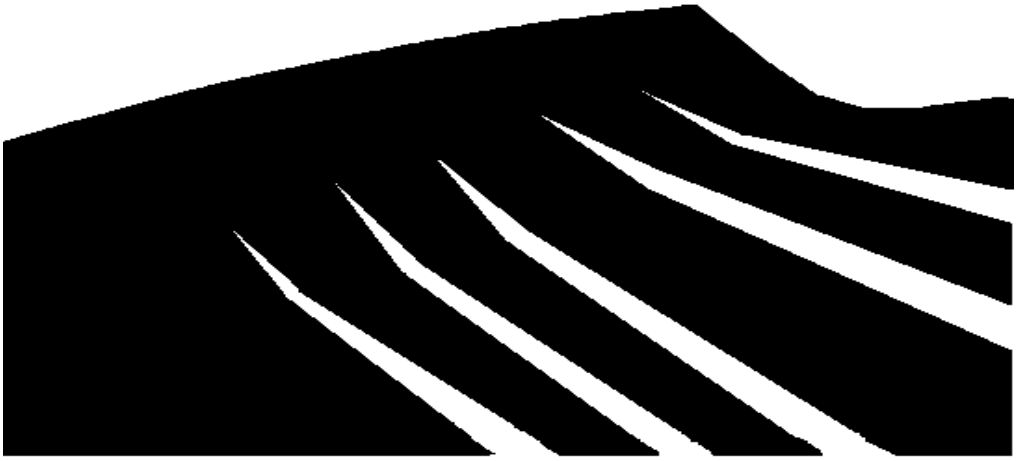

APPROVAL FOR RELEASE	
I. TRIAY - PREPARER Signature on file	DATE
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M. J. CLEVENGER - QUALITY ASSURANCE PROJECT LEADER Signature on file	DATE

Los Alamos
Yucca Mountain Site
Characterization Project

HISTORY OF REVISION

REVISION NO.	EFFECTIVE DATE	PAGES REVISED	REASON FOR CHANGE
R0	02/13/92	N/A	Not applicable.
R1	12/10/96	All	Revised to comply with LANL-YMP-QP-06.3 requirements,. Revision 0 of this procedure was previously identified as LANL-INC-DP-98.

TUFF WAFER EXPERIMENTS

1.0 PURPOSE

The purpose of this procedure is to study sorption on thin tuff wafers for the Dynamic Transport Task by contacting wafers with a solution containing a radionuclide of interest.

2.0 SCOPE

This procedure applies to the assembly, preparation and sampling of tuff wafer experiments within the Dynamic Transport Task of the Los Alamos National Laboratory (Los Alamos) Yucca Mountain Site Characterization Project (YMP).

3.0 REFERENCES

LANL-YMP-QP-02.7, Personnel Training
LANL-YMP-QP-03.5, Procedure for Documenting Scientific Investigations
LANL-YMP-QP-12.1, Procedure for Control of Measuring and Test Equipment
LANL-YMP-QP-17.6, Records Management
LANL-CST-DP-83, Storage and Handling of Solid Samples
INC-SOP-30, 24" Slab Rock Saw
INC-SOP-59, Rock Coring Machine

4.0 DEFINITIONS

4.1 tracer solution = solution containing the radionuclide(s) whose sorptive behavior is to be studies.

The tracer solution is the solution containing the substance(s) whose diffusion behavior is to be studied.

5.0 RESPONSIBILITIES

The following personnel are responsible for the activities identified in Section 6.0 of this procedure.

- Principal Investigator (PI)
- Procedure Users

6.0 PROCEDURE

The use of this procedure must be controlled as follows:

- If this procedure cannot be implemented as written, YMP personnel should notify appropriate supervision. If it is determined that a portion of the work cannot be accomplished as described in this QP, or would result in an undesirable situation, that portion of the work will be stopped and not resumed until this procedure is modified, replaced by a new document, or the current work practice is documented in accordance with QP-03.5, Section 6.1.6.

- Employees may use copies of this procedure printed from the controlled document electronic file; however, employees are responsible for assuring that the correct revision of this procedure is used.

- When this procedure becomes obsolete or superseded, it must be destroyed or marked “superseded” to ensure that this document is not used to perform work.

6.1 Principle

This procedure allows the study of sorption of radioactive tracers into saturated solid tuff samples. A solution containing a radionuclide of interest (tracer) is placed in contact with a wafer or tuff. Aliquots of the tracer solution of the radionuclide into tuff may then be calculated. This rate provides important information on the kinetics of sorption.

6.2 Equipment and Hardware/Software

The following equipment, or its equivalent, is used in this procedure:

- rock coring drill bit
- diamond slab saw
- 1/8 in. diamond drill bit
- orbital shaker
- 50 ml beaker or container
- vacuum oven

6.2.1 Equipment Malfunctions

If the equipment needed to conduct this experiment is found not to be clean or damaged, do not start the experiment until the problem is corrected (i.e., equipment is cleaned, repaired, or new equipment is

procured). A visual inspection of each wafer shall be done. If cracks are detected, the wafer should not be used.

The equipment required to carry out this procedure shall be used in accordance with any applicable LANL safety procedure.

6.2.2 Safety Considerations

6.2.3 Safety Considerations

Read SOP 24" Slab Rock Saw, INC-SOP-50" and "Rock Coring Machine, INC-SOP-59".

6.3 Preparatory Verification

6.3.1 Hold Points

There are no hold points for this procedure

6.3.2 Calibration

Balances used for weighing must be calibrated according to QP-12.1. When data are collected from a balance, the unique identifier number of that balance must be recorded in the user's laboratory notebook along with the data collected. No other equipment requiring calibration is used in this procedure.

6.3.3 Environmental Conditions

No special environmental conditions are required for this DP. If any special conditions are used, they will be recorded according to Section 6.7 of this DP.

6.4 Control of Samples

All samples will be controlled according to DP-83, Storage and Handling of Solid Samples. The unique identifier from the original sample is used; if more than one wafer is used from the same tuff sample, an additional alphanumeric character is added to maintain uniqueness.

6.5 Implementing Procedure

6.5.1 Use a diamond slab saw to cut the tuff specimen to a length compatible with the coring bit.

6.5.2 Coring the specimen with the desired diamond core bit using the coring machine.

6.5.3 Cut the core to the desired thickness with a low speed diamond saw to make the wafer.

6.5.4 Measure the dimensions of the wafer using commercially available hand tools (micrometer or caliper) and record these dimensions in the laboratory notebook.

6.5.5 Drill a 1/8 in. hole in each wafer to be used to suspend the wafer in the desired tracer by plastic thread.

6.5.6 Determine the dry weight of the wafer by drying an adjacent piece of the tuff core in a vacuum oven at 40-50 °C until a constant weight is obtained. Weigh the piece weekly until the weight stabilizes within 0.05 g and record the dry weight.

6.5.7 Determine the saturated (wet) weight of the core piece by placing the piece in a small beaker of the appropriate groundwater (specified by the PI). Place the beaker in a vacuum oven at 40-50 °C. Weigh the piece weekly until the weight stabilizes within 0.05 g and record the wet weight.

6.5.8 Ensure that the following entries are recorded in a notebook:

- unique identifier of each.
- diameter and thickness of each sample and the representative piece of tuff.
- dry weight in grams / wet weight in grams of representative piece.

6.5.9 Pre-equilibrate the tuff wafer in a 50 ml container of the appropriate ground water (specified by the PI) for a minimum of two weeks.

6.5.10 Prepare a solution of the appropriate ground water containing the tracer(s) to be used. The source of the ground water and tracer(s) are specified by the PI.

6.5.11 Decant the pre-equilibration water from the container and add the tracer solution to the container.

6.5.12 Place the container on an orbital shaker at approximately 50 rpm.

6.5.13 Collect aliquots of the solution at predetermined intervals, specified by the PI.

6.5.14 Analyze the concentration of tracer in the aliquot according to the appropriate procedure.

6.5.15 Ensure that the following data are recorded in a notebook:

- date pre-equilibration started
- type of groundwater and volume used to contact wafer during pre-equilibration
- method of preparation for tracer solution
- clock time and date or julian time the tracer solution was added
- volume of tracer solution used to contact wafer
- clock time and date or julian time aliquots were taken
- analytical procedure used to determine concentration of tracer solution aliquots

6.6 Data Acquisition and Reduction

The data will be recorded in the user's laboratory notebook.

6.7 Potential Sources of Error and Uncertainty

Any deviations from this procedure will be documented in the user's laboratory notebook. If the deviations are deemed critical by the PI, then a written statement will be recorded into the user's laboratory notebook evaluating the potential source of error and uncertainty.

7.0 RECORDS

Records generated as a result of this DP are entries in laboratory notebooks or attachments to laboratory notebooks. The documentation should consist of any applicable items identified in Section 6.0 of this procedure. Laboratory notebooks should be kept in accordance with QP-03.5.

All records should be submitted to the Records Processing Center in accordance with QP-17.6.

8.0 ACCEPTANCE CRITERIA

Proper recording of the data specified in Sections 6.5.8 and 6.5.15 constitute the acceptance criteria for this DP. If no critical deviations (see Section 6.7) were made, these data will be accepted as qualified data for YMP.

9.0 TRAINING

9.1 Prior to conducting work described in Section 6.0, the user requires training to this procedure.

9.2 Training to this procedure is accomplished by “read only”. Training will be documented per QP-02.7.

10.0 ATTACHMENTS

N / A